NOTES ON SOME PLANTS OF OKLAHOMA

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IN JULY, 1933, I spent about a week collecting in Oklahoma, entering the state near the northwest corner, approximately on the 101st meridian. Traveling in a south and east direction we crossed the North Canadian River at Beaver, and mainly followed the course of that stream to Woodward. From that point a side trip was made to Grand, in Ellis County, before turning south to the Wichita Mountains, east to the Arbuckle Mountains, and south and east to Hugo, where we crossed Red River into Texas.

In this very hasty dip into the flora of the state, some parts of the trip being in localities I had not visited before, a number of interesting plants were found, some of which have not, so far as I know, been previously reported from Oklahoma.

In the northwest part of the state we were in a typical plains country, with very few native woody plants. The weather was extremely dry, practically no rain having fallen for several months according to reports, and as a visible result trees planted about the primitive farm and ranch houses were dead or dying in many places, and few herbaceous plants were in evidence except along ravines and the borders of streams. Cottonwood trees, the black and sand-bar willow, and the willow-leaved groundsel (*Baccharis salicina*) are common along most small streams, and a few other species begin to appear along the rivers, especially where the country is sandy, as is the case in the vicinity of Beaver. Stopping along a little spring-fed tributary of the North Canadian a mile or two north of that town we were in the edge of the sand hills and dunes with a characteristic flora. The only arborescent species on the dry hills was the hackberry (*Celtis reticulata* var. *vestita*), and these trees were of small size. *Rhus trilobata* and the sand grape, *Vitis Longii,* formed large thickets, with occasional clumps of small plum bushes (*Prunus angustifolia*); *Berula erecta, Samolus parviflorus, Juncus Torreyi, Euphorbia petiolata* and *Asclepias incarnata* were growing along the immediate margins or banks of the little stream, and farther back in the sand dunes we collected *Stillingia sylvatica, Oreocarya suffruticosa, Palafoxia Hookeriana* and *Berlandiera texana.*

Near Laverne, in Harper County, a short stop was made to collect along the gravelly shallow bed of a creek, now entirely dry. *Eustoma*

Russellianum was growing here. This plant of the Gentian family, with its large deep purple flowers and glaucous foliage, is one of the handsomest wild flowers of the plains. Here also we found *Indigofera leptophylla, Cristatella Jamesii, Heliotropium convolvulaceum, Eriogonum annuum, Solidago glaberrima* and several other species which were managing to flower in spite of the drought.

North of Dunlap the dunes are extensively developed. The sage brush covers large areas, and thickets of *Prunus angustifolia* are numerous in slight depressions. Occasional clumps of *Yucca glauca* and of the tall grass, *Calamagrostis gigantea,* stood out conspicuously, and a tall crucifer, *Dithyrea Wislizenii* with its white flowers and curious seed pods, somewhat like a pair of spectacles or a figure eight in outline, was abundant in places.

At Woodward we visited the Northern Great Plains Experiment Station, of the U. S. Department of Agriculture, and were surprised to see the number of native and exotic trees and shrubs that are being grown here, testing their adaptability to the very trying conditions of this part of the country with its comparatively cold winters, hot summers and frequent long periods of drought, which in combination with the variety of soils and other factors makes a most complex problem for the pursuit of agriculture and horticulture even in the subordinate rôle that it plays and seems destined to play in a country more adapted to stock raising and grazing.

We were particularly interested, however, in the native flora, and after having been shown over the station, in the absence of the Director, Mr. E. F. Chilcott, we were guided on a collecting trip by Mr. L. F. Locke and two other members of the staff.

The flora in the vicinity of Woodward is distinctly more varied and abundant than that through which we had been passing farther west in the "Panhandle" counties, and it begins to take on more of the aspect of the southern plains, with but slight resemblance to that of the Mississippi valley and the Middle States. Looking over the landscape from a point of vantage the most striking botanical feature is the shrubby oaks, growing in thickets or "mottes" of varying size from two or three meters to twenty meters or more in diameter. The formation is dense; the largest shrubs near the center are sometimes two or three meters high, decreasing gradually in size towards the margins. There are two varieties of the post oak, *Quercus stellata* var. *rufescens* Sarg. and *Q. stellata* var. *parviloba* Sarg., and with them a more slender species of quite different habit, *Quercus Havardi* Rydb. This species usually grows with single or only a few stems, a meter or a

meter and a half in height, which are often weighed down to the ground with the large crop of heavy acorns. The post oaks apparently propagate both by stolons and seedlings, but probably more commonly by the latter method, as they produce large crops of acorns in most seasons and these germinate readily in the sandy soil in seasons where there is a normal amount of rainfall. Thickets of both *Prunus angustifolia* and *P. gracilis* are frequent as well as *Yucca glauca* which is conspicuous on the dryer slopes and summits of the sand hills. Thickets begin to appear along the smaller streams, in which *Celtis reticulata* var. *vestita*, *Rhus glabra, Ptelea trifoliata, Celastrus scandens, Ampelopsis cordata, Sapindus Drummondii* and *Bumelia lanuginosa* were noted.

Going southward into Ellis County we passed through miles of this type of flora with the mottes of scrub oak scattered over the sand hills stretching as far as could be seen. At the old town of Grand, once an important trading center for this part of the country, but now reduced to a single general store and two or three houses, we came to the main or southern branch of the Canadian River. The country bordering the river at this point is hilly and deeply eroded with ravines and gullies leading down to the alluvial valley. Some of these ravines or small cañons furnish protection to trees and other plants that cannot grow on the plains and that are found nowhere else in this part of the country. One of the most interesting trees of the cañons is *Juglans major* (Torr.) Heller[1], the largest specimens of which were 7 or 8 meters high. Some of the trees were in fruit and old fruit was found under others. There is much variation in the size and shape of the nuts of this species here as in other parts of its range, and the reports of *Juglans rupestris* Engelm. from Oklahoma are probably based upon small-fruited forms of this. At least, I have not seen the latter species in Oklahoma and its range probably does not extend as far north. These trees had been discovered and kept under observation by the botanists of the Experiment Station and seedlings of several of them are in cultivation there. Amongst other woody plants growing in the protection of the cañons were *Juniperus virginiana, Celtis laevigata* var. *texana, Morus rubra* and *Parthenocissus vitacea*. On dry gypseous banks a large-flowered evening-primrose, *Megapterium oklahomense* was in bloom, and a little farther up on open ground was found a shrubby cat's-claw, *Mimosa borealis*. On the hills the soil is gravelly and much eroded, with small masses of sandstone and chert and occa-

[1]Since I have returned to the Arboretum Mr. Lock has sent me specimens of *Juglans major* collected along the North Canadian River, northeast of Woodward, which extends the range of the species considerably farther north than it had previously been known.

sional fragments of silicified wood. *Ceanothus ovatus* var. *pubescens*, *Scutellaria resinosa* and *Houstonia angustifolia* are found along dry banks and ledges, and several sorts of cacti of the genera *Opuntia*, *Neomamillaria* and *Echinocereus* grow on the dry level areas. In the broader open spaces and along the foot of the hills, mesquite trees (*Prosopis juliflora*) are growing and *Ptelea polyadenia* was also collected here.

On leaving Woodward the next day we stopped for a few minutes just south of the little town of Sharon at the crossing of North Persimmon Creek. Here a few more eastern plants begin to put in an appearance. Amongst those seen along the creek were *Quercus macrocarpa*, *Q. Muhlenbergii*, *Morus rubra*, *Ribes odoratum*, *Rubus flagellaris*, *Cornus asperifolia* and *Cocculus carolinus*.

Proceeding south we arrived sometime in the afternoon at Hobart on the edge of the Wichita Mountains. This group consists of a series of knobs and ridges of granite and other igneous rocks, which, due to their greater resistance have been preserved as the softer sedimentary strata into which they were originally intruded, have been removed by erosion. Some of the domes stand out impressively on the sky-line, but they are seldom more than a few hundred feet above the surrounding plain.

Our first stop was made near the village of Lone Wolf, where we climbed some of the low foot-hills. *Juglans major* is rather frequent here growing in the protection of ledges and clefts, and the shrubby honeysuckle of the Southwest, *Lonicera albiflora* was also collected. Two southwestern ferns, *Cheilanthes Eatoni* and *Notholaena Hookeri* were growing in rubble and clefts of the granite, but most of the fronds were too much withered to be collected.

As there were no camping facilities here and it was getting late, we turned back east to Coopertown, just beyond which we entered the Wichita National Forest and stopped for the night at a camping place along a little mountain stream, now quite dry. The following morning Mr. Edward King, my traveling companion, and I set out to explore the surrounding region.

The forest is in most places very sparse, most of the woody species being confined to the vicinity of small streams and ravines or to the bases of the more precipitous hills. A few small trees and shrubs are found higher up on the hills or on their summits wherever there is a little irregularity of surface to afford some protection. There are wide open spaces between the hills with a grassy and herbaceous flora and sometimes with a few mesquite trees. Even along the mountain streams

and in the little valleys where the trees reach their largest size, there is little that can be called real forest. Post oak, black oak, mulberry, and hackberry are amongst the commonest tree, with cottonwood (*Populus balsamifera*), Ward's willow (*Salix longipes* var. *Wardii*), walnut (*Juglans major*), cat-briar (*Smilax Bona-nox*) and buttonbush growing along the immediate margins of the creeks. The big-tree plum (*Prunus mexicana*) and the false grape (*Ampelopsis cordata*) were also collected here. The red cedar (*Juniperus virginiana*) and black jack oak (*Quercus marilandica*) are sometimes found on the higher slopes or tops of the mountains, and the lead plant (*Amorpha canescens*) on dry rocky slopes. *Acacia angustissima* and a curious woody vine with fleshy leaves (*Cissus incisa*) were growing in clefts of the rock. A species of wafer ash, which appears to be *Ptelea aboriginum* Greene, was collected on a rocky open slope, and in a little cove a little higher up I found *Rubus oklahomus,* a species of blackberry recently described by Dr. Bailey, and near by was a large sized tree of *Crataegus Stevensiana* Sarg., which was the only species of this large group seen in the forest.

On a north slope, below a small granite bluff, a small thicket of the western choke cherry (*Prunus virginiana* var. *demissa*) was growing and in clefts of the bluff we collected the marginal shield fern (*Thelypteris marginalis*) and *Arenaria stricta* var. *texana.* Before returning to the camp we crossed an open valley to another granite ridge with a rather heavy growth of woods along the base. In the rubble and large detached masses of rock here we found the little Rocky Mountain maple (*Acer grandidentatum*). As it grows here, it is a stout shrub not more than two or two and a half meters in height, with branches scarcely extended above the height of the rocky walls in the protection of which it was growing. This is the most eastern known limit for this western species and its presence here is particularly interesting as indicating a former invasion of Rocky Mountain plants into the region. Another shrubby plant that attracted our attention from its showy appearance was a form of *Cephalanthus occidentalis* growing in springy ground along a little creek, and covered with fruit of a bright red color. This might very well be used as an ornamental plant if the color of the fruit could be retained in cultivation.

Herbaceous plants were not much in evidence at this dry season. Amongst the most conspicuous were *Eriogonum longifolium, Grindelia nuda, Gaillardia pulchella* and *Thelesperma ambiguum,* which were still flowering. I also collected *Portulaca lanceolata* in decomposed granite near Lone Wolf, *Aristida Wrightii,* which is one of the commonest

grasses, *Houstonia angustifolia*, *Scutellaria resinosa* and *Commelina erecta* in rocky open ground, and *Cyperus Schweinitzii* and *Sabbatia campestris* in moist ground along a little brook.

After having lunch we loaded the car and set out eastward towards Paradise Springs where we planned to stop for the night. Several stops were made to take photographs of the hills and of some of the plants, and to collect plants along a branch of Cache Creek. This was a rather larger stream than those we had been on before and additional species began to appear. The chinquapin oak (*Quercus Muhlenbergii*) and the red and green ash (*Fraxinus pennsylvanica* and *F. pennsylvanica* var. *lanceolata*) were growing along the creek bank. We crossed this stream or another branch of it again near the Forest Headquarters, and here we added the pecan (*Carya pecan*), Schneck's oak (*Quercus Shumardii* var. *Schneckii*) and the little sand grape (*Vitis rupestris*) to our list. The grape vine was growing in the shingle and gravel of the creek bed and trailing over the larger rocks, which is a characteristic habitat for this species. Only one tree of Schneck's oak was seen on the creek bank here, but it becomes commoner a little farther south and west, where I have collected it near the village of Cache.

The following day, without having made other stops, we arrived at the Arbuckle Mountains, stopping first to have lunch at Turner Falls State Park, which has been made a popular resort. Here we were in a region of striking contrast in many respects to the Wichita Mountains. If the Wichita Mountains are such only by courtesy, it might be thought to put a strong tax upon the proprieties or at least upon scientific accuracy to designate the Arbuckle region as a mountainous one. The low rounded hills are underlaid largely by a hard Paleozoic limestone, through which has been thrust a mass of porphyritic intrusive rocks that now come to the surface over a small area. The limestone is exposed on many of the hill tops and slopes and as bluffs at some places along the Washita River which traverses the region. The soil is therefore decidedly alkaline over much of the area, although it is sandy and more acid in parts of the river valley as well as where the igneous rocks are exposed. The general aspect of the country with the outcrops of hard pure limestone eroded by occasional torrential rains that interrupt the usually dry climate, give it a strong resemblance to parts of the Edwards plateau in central Texas, an impression which a study of the flora strongly confirms. The following list of plants, although necessarily a very incomplete one, resulting from collecting for only parts of two days, clearly shows this relationship, and it is scarcely

an exaggeration to say that the Arbuckle Mountains, so far as the flora is concerned, constitutes a northern extension and the farthest outpost of that interesting flora.

Cheilanthes Feei Moore
Cheilanthes tomentosa Link
Pellaea atropurpurea (L.) Link
Juniperus mexicana Spreng.
Uniola latifolia Michx.
Carya Buckleyi Durand
Carya cordiformis (Wangh.) K. Koch
Juglans major (Torr.) Heller
Quercus Muhlenbergii Engelm.
Quercus prinoides Willd.
Quercus texana Buckley
Quercus Shumardii var. Schneckii (Britt.) Sarg.
Ulmus alata Michx.
Celtis laevigata Willd.
Morus microphylla Buckley
Clematis Simsii Sweet
Ribes odoratum Wendl.
Rosa carolina L.
Rosa foliolosa Nutt.
Rubus trivialis Michx.
Crataegus bellica Sarg.
Crataegus limaria Sarg.
Crataegus viridis L.
Sophora affinis T. & G.
Cercis reniformis Engelm.
Psoralea Reverchoni Wats.
Amorpha canescens Pursh
Phyllanthus polygonoides Spreng.
Acalypha gracillima var. monococca Engelm.
Rhus copallina L.
Rhus copallina var. lanceolata Gray
Aesculus arguta Buckley
Ceanothus ovatus var. mollis T. & G.
Rhamnus caroliniana var. mollis Fern.
Ptelea nitens? Greene
Abutilon incanum Don
Sapindus Drummondii H. & A.
Vitis cordifolia Lam.
Vitis rupestris Scheele
Ampelopsis arborea (L.) Koehne
Hypericum cistifolium Lam.
Ascyron hypericoides L.
Opuntia leptocaulis DC.
Convolvulus incanus Vahl
Evolvulus argenteus Pursh
Heliotropium tenellum (Nutt.) Torr.
Verbena bipinnatifida Nutt.
Fraxinus texensis (Gray) Sarg.
Forestiera pubescens Nutt.
Satureja arkansana (Nutt.) Briq.
Lonicera albiflora T. & G.
Viburnum rufidulum Raf.
Grindelia lanceolata Nutt.
Helianthus hirsutus Raf.

Particularly significant is the occurrence here of such typically Texan species as *Juniperus mexicana, Carya Buckleyi, Quercus texana, Morus microphylla, Cercis reniformis, Psoralea Reverchoni, Rhus copallina* var. *lanceolata, Abutilon incanum, Opuntia leptocaulis* and *Fraxinus texensis*. Many of the other plants are also characteristic species of the Edwards plateau flora although of somewhat wider range. Several of the plants on the list, which have a generally more northern

and eastern range, as for example *Carya cordiformis, Rosa carolina, Rhus copallina, Vitis cordifolia* and *Ascyron hypericoides,* were not collected or noted on or near the limestone outcrops but along the river or in areas having a different type of soil.

Specimens of all of the woody plants mentioned in this paper are deposited in the herbarium of the Arnold Arboretum, and the herbaceous species may be found in the Gray Herbarium. Duplicates of most of them have been distributed to other institutions.

HERBARIUM, ARNOLD ARBORETUM,
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